[16th July 1953

## APPENDIX XXI.

[*Vide* answer to unstarred question No. 80 asked by Sri V. K. Ramaswami Mudaliar at the meeting of the Legislative Assembly held on 16th July 1953, pages 291–292 supra.]

### STATEMENT I.

Clause (*a*)—

*The average yield per acre of paddy for the years from* 1930–31 *to* 1950–51.

| | | LB. | | | LB. |
|---|---|---|---|---|---|
| 1930–31 | Irrigated .. .. | 1,679 | 1941–42 | Irrigated .. .. | 1,722 |
| | Unirrigated .. .. | 1,170 | | Unirrigated .. .. | 1,266 |
| 1931–32 | Irrigated .. .. | 1,722 | 1942–43 | Irrigated .. .. | 1,573 |
| | Unirrigated .. .. | 1,154 | | Unirrigated .. .. | 1,181 |
| 1932–33 | Irrigated .. .. | 1,737 | 1943–44 | Irrigated .. .. | 1,590 |
| | Unirrigated .. .. | 1,147 | | Unirrigated .. .. | 1,193 |
| 1933–34 | Irrigated .. .. | 1,666 | 1944–45 | Irrigated .. .. | 1,631 |
| | Unirrigated .. .. | 1,144 | | Unirrigated .. .. | 1,153 |
| 1934–35 | Irrigated .. .. | 1,664 | 1945–46 | Irrigated .. .. | 1,441 |
| | Unirrigated .. .. | 1,103 | | Unirrigated .. .. | 1,196 |
| 1935–36 | Irrigated .. .. | 1,706 | 1946–47 | Irrigated .. .. | 1,569 |
| | Unirrigated .. .. | 1,113 | | Unirrigated .. .. | 1,204 |
| 1936–37 | Irrigated .. .. | 1,738 | 1947–48 | Irrigated .. .. | 1,466 |
| | Unirrigated .. .. | 1,217 | | Unirrigated .. .. | 1,076 |
| 1937–38 | Irrigated .. .. | 1,705 | 1948–49 | Irrigated .. .. | 1,431 |
| | Unirrigated .. .. | 1,220 | | Unirrigated .. .. | 1,154 |
| 1938–39 | Irrigated .. .. | 1,504 | 1949–50 | Irrigated .. .. | 1,332 |
| | Unirrigated .. .. | 1,035 | | Unirrigated .. .. | 1,064 |
| 1939–40 | Irrigated .. .. | 1,603 | 1950–51 | Irrigated 1st corp. | 1,379 |
| | Unirrigated .. .. | 1,187 | | 2nd crop. | 1,353 |
| 1940–41 | Irrigated .. .. | 1,717 | | 3rd crop .. | 1,268 |
| | Unirrigated .. .. | 1,181 | | | |

### STATEMENT II.

Clause (c)—

*A. A gist of the results achieved from the experiments conducted at the Agricultural Research Stations.*

Systematic experiments on manuring with up-to-date layout and statistical reduction have been conducted in the Agricultural Research Stations in the past and the following is the gist of the results :—

1. Application of green manure from 2,000 to 8,000 lb. recorded increases varying from 8 to 42 per cent.

2. Comparing green leaf with ammonium sulphate on 30 lb. nitrogen basis it was found that both are more or less equally efficacious, though there are slight differences ;

3. Super phosphate in combination with green leaf was more efficacious than when applied singly ;

4. Higher dose of nitrogen up to 120 lb. nitrogen level were tried in several Research Stations with three levels of phosphoric acid also.
The results showed that the response in different seasons was different, but, in the main, the trend was that nitrogen up to 45 lb. in most of the cases secures 20 to 25 per cent increased yield.

16th July 1953]

The research so far conducted lead to the following general recommendations :—

(*a*) Green manure up to 6,000–8,000 lb. plus super phosphate up to 100-150 lb. may be placed in the soil before planting.

(*b*) With a small dressing of leaf manure ammonium sulphate 20–30 lb. plus super phosphate 100–150 lb. per acre may be issued.

(*c*) Compost and cattle manure are better used on garden lands.

(*d*) Ammonium sulphate may be applied three to four weeks after transplantation.

*B. The manures recommended and dosages per acre for paddy.*

| *Name of Research station typical of the tract.* | *Dosage.* |
|---|---|
| | Purely nitrogenous manures. |
| Maruteru .. .. | Green manure 4,000 to 5,000 lb. or groundnut-cake 675 lb. or ammonium sulphate 100 lb. |
| Samalkot .. .. | Green manure 6,000 lb. or ammonium sulphate 150 lb. |
| Anakapalle .. .. | Green manure 6,000 to 8,000 lb. |
| Aduthurai .. .. | Ammonium sulphate 150 lb. or green manure 4,000 lb. |
| Coimbatore .. .. | Ammonium sulphate 150 lb. or groundnut cake 425 lb. or green manure 6,000 lb. |
| Pattambi .. .. | Ammonium sulphate 150 lb. or groundnut-cake 425 lb or green manure 5,000 lb. |
| | Combination of organic and incorganic nitrogen. |
| Maruteru .. .. | Green leaf 2,000 lb. plus ammonium sulphate 100 lb. |
| Pattambi .. .. | 1. Castor cake 700 lb. plus ammonium sulphate 75 lb.<br>2. Green leaf 4,000 lb. plus ammonium sulphate 75 lb.<br>3. Groundnut-cake 425 lb. plus ammonium sulphate 75 lb. |
| | Combination of nitrogen and phosphatic manures. |
| Samalkot .. .. | 1. Green manure 5,000 lb. plus super phosphate 170 lb.<br>2. Ammonium sulphate 150 lb. plus super phosphate 170 lb.<br>3. Green manure 2,250 lb. plus super phosphate 170 lb. plus ammonium sulphate 75 lb. |
| Maruteru .. .. | 1. Green leaf 2,000 lb. plus ammonium sulphate 160 lb. plus super phosphate 180 lb.<br>2. Groundnut-cake 650 lb. plus flour phosphate to supply 48 lb. of $P^2 O^5$. |

[16th July 1953

| Name of Research Station typical of the tract. | Dosage. |
|---|---|
| | **Purely nitrogenous manures.** |
| Aduthurai .. .. | 1. Ammonium sulphate 100 lb. plus super phosphate 75 lb. |
| | 2. Green leaf 2,000 lb. plus super phosphate 112 lb. |
| Coimbatore .. .. | Green leaf 5,000 lb. plus super phosphate 112 lb. |
| Pattambi .. . | Green leaf 5,000 lb. plus super phosphate 112 lb. |

## STATEMENT III.

Clause (c)--

*The maximum and minimum yields of paddy obtained from the treatments referred to in Statement II.*

### I. Green manure experiment.

| *Agricultural Research Station.* | *Doses of green manure applied (lb. per acre).* | *Yield in lb. per acre.* Without green manure (control). | With green manure minimum. | Maximum. |
|---|---|---|---|---|
| Maruteru .. .. .. | 2,000—4,000 | 1,500 | 1,725 | 2,055 |
| Samalkota .. .. | 4,500—6,750 | 3,000 | 3,810 | .. |
| | | 2,000 | .. | 2,700 |
| Anakapalle .. .. | 3,000—8,000 | 2,300 | 2,576 | .. |
| | | 1,800 | 2,178 | .. |
| | | 1,800 | 2,592 | 2,718 |
| Coimbatore .. .. | 4,500—6,000 | 2,400 | 2,736 | 2,808 |
| Pattambi .. .. | 4,000—8,000 | 1,500 | .. | 1,725 |
| | | 1,600 | .. | 2,256 |
| | | 1,800 | .. | 2,286 |
| | | 1,300 | .. | 1,846 |

### II. Comparison of yields with green manure and ammonium sulphate.

| *Agricultural Research Station.* | *Yield per acre in lb.* No manure (control). | Green manure. | Ammonium sulphate. | *Dosage of nitrogen.* RS. |
|---|---|---|---|---|
| Samalkot .. .. | 3,000 | 3,275 | 3,360 | 30 |
| Maruteru (2nd crop) .. | 1,500 | 2,010 | 1,920 | 22 |
| Aduthurai .. .. | 2,500 | 3,725 | 3,125 | 30 |
| Coimbatore .. .. | 3,300 | 3,760 | 4,191 | 30 |
| Pattambi (1st crop) .. | 1,300 | 1,850 | 1,846 | 30 |
| Do 2nd crop) .. | 1,700 | 2,260 | 2,280 | 30 |

### III. Super-phosphate in combination with green manure.

| *Agricultural Research Station.* | *Acre yield in lb.* No manure (control). | Green manure. | Super alone. | Green manure plus super. | *Levels of* Nitrogen. LB. | Phosphoric acid. LB. |
|---|---|---|---|---|---|---|
| Samalkot (2nd crop) .. | 1,900 | .. | .. | 2,489 | 30 | 30 |
| Maruteru .. | 1,500 | 1,605 | .. | 1,900 | 12 | 32 |
| Aduturai (1st crop) .. | 2,500 | .. | .. | .. | 30 | 30 |
| Do. (2nd crop) .. | 1,700 | .. | 1,785 | .. | 30 | 30 |
| Coimbatore .. .. | 2,100 | 2,625 | 2,300 | 2,625 | 12 | 20 |
| | 2,100 | 2,470 | 2,520 | 2,940 | 20 | 30 |

16th July 1953]

## IV. Higher doses of nitrogen up to 120 lb. with three levels of phosporic acid.

| Agricultural Research Station. | Nitrogen lb. per acre (as ammonium sulphate). 0 lb. | 30 lb. | 60 lb. | 90 lb. | 120 lb. | Remarks, |
|---|---|---|---|---|---|---|
| | *Acre yield in lb. per acre.* | | | | | |
| Coimbatore I crop (average for two years). | 2,741<br>100·0 | 3,005<br>109·6 | 3,236<br>118·1 | 3,210<br>117·1 | 3,186<br>116·2 | There is proportionate increase up to 60 lb. after which due to rank growth and consequent unsetting the yield is affected. |
| Pattambi I crop (average for two years). | 2,040<br>100·0 | 2,149<br>105·3 | 2,255<br>110·5 | 2,320<br>113·7 | 2,355<br>115·4 | The increase is directly proportionate to dose of nitrogen. |
| II crop .. .. (average for two years). | 3,138<br>100·0 | 3,236<br>103·1 | 3,248<br>103·5 | 3,344<br>106·6 | 3,406<br>108·5 | |
| Maruteru I crop .. (average for two years). | 2,227<br>100·0 | 2,234<br>100·3 | 2,203<br>98·9 | 1,998<br>89·7 | 1,632<br>73·3 | The rapid fall in yield as nitrogen increases is due to premature logging consequent on rank growth. |
| II crop .. .. (average for two years). | 2,357<br>100·0 | 2,512<br>106·6 | 2,586<br>109·7 | 2,624<br>111·3 | 2,559<br>108·6 | The increase in yield is not commensurate with increase in nitrogen. |
| Aduthurai Kuruvai crop. | 2,794<br>100·0 | 3,239<br>115·9 | 3,422<br>122·1 | 3,750<br>134·2 | 3,771<br>135·0 | The increase is directly proportional to increase in dose of nitrogen. |
| Samba crop .. | 4,138<br>100·0 | 4,343<br>104·9 | 4,300<br>104·0 | 3,978<br>96·1 | 3,760<br>90·9 | As nitrogen dose is increased beyond 30 lb. there is a fall in yield. |

| Agricultural Research Station. | $P_2O_5$ lb per acre. 0 | 30 | 60 | Remarks. |
|---|---|---|---|---|
| Coimbatore I crop .. (average for two years). | 2,962<br>100·0 | 3,109<br>105·0 | 3,145<br>106·2 | There is a fair response up to 30 lb. phosphoric acid. |
| Pattambi I crop (average for two years). | 2,213<br>100·0 | 2,212<br>100·0 | 2,232<br>100·9 | The increase in yield is not commensurate with increase in phospherous pentoxid. |
| II crop .. .. .. (average for two years). | 3,265<br>100·0 | 3,225<br>98·8 | 3,333<br>102·1 | |
| Maruteru I crop .. .. (average for two years). | 1,995<br>100·0 | 2,119<br>106·2 | 2,091<br>105·0 | The differences in yield are erratic. |
| II crop .. .. .. (average for two years). | 2,513<br>100·0 | 2,526<br>100·5 | 2,565<br>102·1 | The increases are not commensurate with increase in dose of phosphoric acid. |
| Aduthurai Kuruvai .. .. (average for two years). | 3,340<br>100·0 | 3,406<br>102·0 | 3,434<br>102·8 | The increases in yield are not commensurate with increased dose of phosphoric acid. |
| Samba .... .. .. (average for two years). .. | 4,105<br>100·0 | 4,077<br>99·3 | 4,130<br>100·1 | |

[16th July 1953

V. With a small quantity of green leaf as basal (preliminary) dressing, ammonium sulphate, 20 to 30 lb. gives good yields.

(Ammonium sulphate as basal dressing of leaf.)

| Agricultural Research Station. | Doses per acre in lb. | | N. applied per acre in lb. | | | Yield per acre in lb. | | |
|---|---|---|---|---|---|---|---|---|
| | Green leaf. | Ammonium sulphate. | Green leaf. | Ammonium sulphate. | Total. | No manure (control.) | Manured. | Increase in per cent. |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Maruteru .. | 2,000 | 80 | 12 | 16 | 28 | 1,500 | 2,140 | [illegible]0 |
| | 2,000 | 160 | 12 | 32 | 44 | 1,500 | 2,160 | 44 |
| | 2,000 | 240 | 12 | 48 | 60 | 1,500 | 2,340 | 56 |
| Coimbatore .. | 2,000 | 100 | 12 | 20 | 32 | 3,000 | 3,300 | 10 |
| | 2,000 | 200 | 12 | 40 | 52 | 3,000 | 3,510 | 17 |
| | 2,000 | 400 | 12 | 80 | 92 | 3,000 | 3,930 | 31 |

## STATEMENT IV.

Clause (c)—

*Japanese method of manuring and the average yield obtained.*

*Manuring of paddy in Japan.*—Green manure of Astragalus species (soya bean variety) is sown in the field. Soya beans are also used as green manure and applied three weeks before transplanting.

If no green manure crop is grown, green leaf up to the quantity available is cut from the nearby forests and applied to fields. Lime (to help green to decompose in certain areas) at 700 lb. per acre is also applied.

Over the green manure applications, the following artificial fertilisers are applied :—

Ammonium sulphate to supply 58 to 135 lb. of nitrogen per acre, i.e., 290 to 675 lb. of ammonium sulphate.

Phosphoric acid to supply 35 to 90 lb.—200 lb. to 500 lb. of super.

Potash to supply 50 to 100 lb. per acre as potassium sulphate or chloride. This is done only on some farms.

Other materials which are used as food for the plant are used as given below :—

(i) Barn yard manure (cattle manure).

(ii) Compost, tank silt.

(iii) Night-soil (human excrement).

(iv) Green manure.

(v) Ammonium sulphate.

(vi) Calcium cyanide.

(vii) Soya bean oil-cake.

(viii) Fishmeal.

16th July 1953]

(ix) Rice bran.

(x) Rape seed meal.

(xi) Superphosphate.

(xii) Wood ashes.

(xiii) Potassium sulphate.

(xiv) Potassium chloride.

All the manures except green manure are applied in dry condition and as soon as the mixing is over, water is let in and puddled.

*Yields.*—No information is available giving details about yields of different types of manuring in Japan. The average yields of paddy per acre for five-year periods, i.e., 1936–40 when there was supply of artificials and 1941–45 when due to war the supply of artificials was restricted are given below :—

| | | | |
|---|---|---|---|
| 1936–40 | .. | Paddy 3,370 lb. | (74·8 bushels or 45 lb. each.) |
| 1941–45 | .. | Do. 3,030 lb. | |

STATEMENT V.

*Leaflet on the Japanese Method of Rice Cultivation as modified to suit conditions in the Madras State.*

I. In the Japanese method of growing paddy stress is laid on—

(A) Raising robust seedlings in thinly sown seed beds,

(B) proper manuring, and

(C) adequate after-care of the crop.

II. *Raising of seedlings.*—(1) *Methods in vogue.*—In the Madras State there are three methods of preparation of seed-beds, (i) dry, (ii) moist and (iii) wet. For every acre of the planted area the area of seed bed should be 7 to 8 cents.

Dry nurseries are raised in areas like the West Coast where there is adequate rain during the sowing season.

The moist seed-beds are common for the first crop in the delta districts where the time of availability of irrigation water for transplanting is uncertain, for under this method the growth of seedlings can be adjusted.

Wet seed-beds are raised in places where there is assured supply of water for all operations.

(2) *Preparation of seed-bed*—(*a*) *Dry and moist seed-beds.*—(i) Select a suitable area for seed-bed and plough repeatedly. Apply about 20 cart-loads of farm-yard manure per acre and plough until a fine filth is obtained.

(ii) Form beds of convenient size 4 to 5 feet wide and about 3″ above the level of the ground. A space of one foot wide is left between the beds to facilitate weeding and watering.

(*b*) *Wet seed-bed.*—(i) Repeatedly plough the selected area with the summer showers. Apply 6 to 8 cart-loads of green leaves or 15 to 20 cart-loads of farm-yard manure per acre about ten days before the time of sowing.

(ii) Level and form beds of convenient size with channels at regular intervals for irrigation and draining the area.

[16th July 1953

III. *Seed selection.*—(*a*) The Madras Agricultural Department has evolved 172 improved strains to suit the different tracts and seasons in over 80 per cent of the paddy area in the State. Every ryot should aim at developing his seed requirements in a specially selected part of his field. If he has no stock of improved seeds suited for the particular season and area, he should obtain the seeds from the local Agricultural Demonstrator or approved seed farm grower.

(*b*) Heavier seeds have been found to give better result in the case of the short-duration varieties only. Separate the heavier seeds by immersing the seeds in salt water solution prepared by dissolving half a Madras measure of salt in a gallon (6 kerosene oil bottles) of water. This quantity of solution would be sufficient to treat 20 lb. of seeds required for sowing in an acre. For medium and long-duration varieties, separate merely the chaff by immersing the seeds in water.

(*c*) In areas where foot rot is prevalent the seed should be washed with water, air-dried and treated with Agrosan G. or Coresan powder. Two tolas of the powder will be sufficient for treating 20 lb. of seed.

NOTE.—Agrosan and Coresan are highly poisonous and should be handled carefully and treated seeds should not be used for any other purpose. Wash the treated seeds to remove the chemicals and air-dry.

IV. *Sowing.*—(*a*) Sow at the rate of one viss (3 lb.) of paddy seeds for every cent of seed-bed. This quantity may be reduced in the case of the finer varieties and increased for coarser varieties. Thicker sowing results in weak seedlings.

(*b*) In a separate portion of the seed-bed sow *sesbania speciosa* for planting in the margins of the paddy field as explained in greater detail later under "Self-sufficiency in green manures." About ¼ lb. of Sesbania seed may be sown in one cent of land for producing enough seedlings to produce 4,000 to 6,000 lb. of green manure.

(*c*) *Sowing in dry nursery.*—(1) Before sowing, smoothen the surface and cover the seed-bed with a thin layer of ash.

(2) If there is no rain within three days after sowing, sprinkle water carefully.

(*d*) *Sowing in wet seed-beds.*—(1) The selected seeds should be sprouted by soaking the seeds in water. For this purpose, the seeds are put in a gunny bag and immersed in water for 12 to 24 hours. The water is drained and the bag kept in a dark place covered with straw and weights are placed over it. After 24 hours the grains begin to sprout.

(2) Irrigate the seed-bed and drain the water at the time of sowing leaving only about half an inch of water over the bed.

(3) Drain off the water a day after sowing and regulate the subsequent watering according to weather conditions.

(*e*) *Care of seedlings.*—(1) The seedlings should remain on the land for 20–25 days in the case of the short-duration varieties and 30–35 days in the case of medium or long-duration varieties. Normally the seed-bed duration is reckoned at one week for every month in the life of the crop from sowing to harvest, e.g., for a five months' duration crop the age of the seedlings should be five weeks at the time of transplanting.

16th July 1953]

(2) Remove all weeds carefully from the seed-bed.

(3) Water regularly if there are no rains.

(4) If the seedlings have not grown well, apply 1 lb. of ammonium sulphate for every cent to push up the growth.

V. *Manuring of paddy.*—(*a*) To secure high yields, the paddy field should be properly manured.

(*b*) Best results are obtained by applying organic manures (green manures farm-yard manure or composts) and inorganic fertilizers (nitrogenous fertilizers, like ammonium sulphate, phosphatic fertilizers like super-phosphates, bone ash, bone-meal), etc.

(*c*) The optimum dose of organic manures per acre in 4 to 6 cart-loads of green manure or 10 to 15 cart-loads of farm-yard manure or composts.

(*d*) Nitrogenous fertilizers induce vegetative growth and phosphatic fertilizers promote yield of grain.

(*e*) The optimum dose of ammonium sulphate is 150 lb. per acre. In areas where blast is endemic not more than 100 lb. should be applied unless a blast resistant variety is grown.

(*f*) Reduce the dose of ammonium sulphate if there is premature lodging.

(*g*) The optimum dose of phosphatic fertilizers is 150 lb. of super-phosphate or bone-meal. Increase this if there is excessive leafy growth.

(*h*) The dosage of organic and inorganic manures may be increased or reduced on the basis of the response of crop. Always regulate the dosage to suit local conditions and past experience of your field.

VI. *Self-sufficiency in green manure.*—(*a*) Hardly 20 per cent of the paddy area in the State is manured with five cart-loads of organic manure for want of adequate supplies.

(*b*) Among organic manure it is easy to step-up production of only green manures.

(*c*) To obtain four to six cart-loads of green leaves per acre, green manure may be raised *in situ*.

(*d*) Where the soils are light, sow 30 lb. of kolingi (wild indigo) about seven days before the harvest of paddy. Pulses like green or blackgram can be sown along with 15 to 20 lb. of kolingi per acre.

(*e*) For medium and heavy soils where irrigation can be had in June or July and transplantation goes on till September, a green manure crop of daincha sunnhemp, pillipesara or *Sesbania speciosa* may be raised in the field by sowing 20 to 30 lb. of seeds after receipt of irrigation water.

NOTE.—Heavy soils should not be ploughed if no green manure or other crop is raised as such ploughing depresses the yield of paddy.

(*f*) Every ryot should aim at producing his requirements of green manure on the sport by raising *Clyrcidia maculata* on the bigger field bunds and by utilizing the margins of the field for growing *Sesbania speciosa*. One line of sesbania planted 2 inches apart along with the paddy seedlings in the field will grow up to 10 feet in three to four months without affecting the paddy crop. By the time paddy is harvested four to six cart-loads of green manure can be got which can be either applied to the paddy crop that follows immediately or dried and stocked without composting and applied when necessary.

[16th July 1953

(*g*) The ryot should leave a few plants of sesbania for seed production. Each plant will produce up to 4 oz. of seeds and therefore a few plants will be enough to make a ryot self-sufficient in sesbania seeds.

VII. *Preparing the field.*—(1) After the receipt of irrigation water, plough the land well.

(2) Apply green manure uniformly at 4 to 6,000 lb. per acre and plough it in at least a week before transplanting paddy.

(3) Where green leaf is not available, apply cattle manure at ten cart-loads per acre.

(4) Trim the bunds and fill cracks to prevent leakage of water.

(5) In areas deficient in phosphates, give a final ploughing with very little water in the field. Apply super-phosphate at 150 lb. per acre by placing it in the furrow and cover it with a levelling board.

VIII. *Transplantation.*—The number of plants per hole and the spacing will vary with variety, duration of crop, the season of planting and the fertility of the field. Proper spacing may vary from 4 inches to 9 inches. In the early varieties, closer spacing and planting of seedlings up to five per hole can be adopted. In the case of the long-duration varieties, fewer seedlings per hole with wider spacing produce best results. Optimum spacing for each field should be determined by the cultivator himself from his experience. Planting regularly in rows will help inter-culture and weeding.

IX. *After-care.*—(1) Fifteen days after planting, drain the field.

(2) Apply 150 lb. of ammonium sulphate immediately before the first weeding.

(3) Remove the weeds and loosen the soil around the plants with the hand or feet to the extent possible.

(4) Irrigate the field thereafter at suitable intervals depending upon the season.

(5) In the case of the second crop apply 150 lb. of ammonium sulphate before first weeding and 75 lb. a fortnight later.

(6) Stop all field operations about two weeks before flowering.